

AMENDMENT NO. 2 TO AGREEMENT TO PROVIDE FY14 ENGINEERING SERVICES
FOR NORTH AND SOUTH DURHAM WATER RECLAMATION FACILITY
IMPROVEMENTS BETWEEN THE CITY OF DURHAM AND HAZEN AND SAWYER,
P.C.

This contract amendment (“Amendment No. 2”) is dated and entered into as of the _____ day of _____, 20____, between Hazen and Sawyer, P. C., a foreign corporation authorized to do business in the State of North Carolina, (hereinafter referred to as the “Engineer”) and City of Durham (hereinafter referred to as the “City”).

The City and the Engineer entered into a contract titled “Agreement to Provide FY14 ENGINEERING SERVICES FOR NORTH AND SOUTH DURHAM WATER RECLAMATION FACILITY IMPROVEMENTS between the City of Durham and Hazen and Sawyer, P.C.”, dated June 30, 2014. That contract is referred to as the “Original Contract.”

The parties executed an amendment to the Original Contract titled “Amendment No. 1 to Agreement to Perform Professional Engineering Services to FY14 Engineering Services for North and South Durham Water Reclamation Facility Improvements between the City of Durham and Hazen and Sawyer, P.C.”, dated January 16, 2015. That amendment is referred to as Amendment No. 1. The purpose of Amendment No. 1 was to add services related to the preparation of a Certified Letter of Map Revision for the North Durham Water Reclamation Facility flood wall.

The Original Contract is hereby amended as follows:

1. Delete Section A.1.00 from Exhibit A and replace with the following.
A.1.00 Applicability of Basic Services – The following listed Basic Services shall **not** apply to this Agreement: Section A.1.06 Post Construction Phase;
2. Add Exhibit A2 – Detailed Design Services, after Exhibit A1;
3. Add Exhibit A3 – Construction Phase Services after Exhibit A2;
4. Delete Section C4.01.A.1 of Exhibit C and replace with the following;

The Owner shall pay Engineer an amount of up to \$1,247,599.00 (\$1,237,599.00 lump sum, \$10,000.00 not-to-exceed) for the amended Study and Report Phase services. The Owner shall pay Engineer an amount of up to **\$4,330,000 (\$3,654,946 lump sum, \$675,054 not-to-exceed fee) for Detailed design phase services (Exhibit A2) and those Construction related services detailed in Exhibit A3** based on the following assumed distribution of compensation (Design Phase and Bid/Construction Administration Phase – Lump Sum and Construction Inspection Phase, Permitting Services, and Additional Floodplain Services – Billing Rates based on direct labor multiplier). The Total Contract Amount shall be adjusted as follows:

Scope of Services Description	Base Fee	Amendment No.1	Amendment No.2	
			Lump Sum	Not to Exceed Fee*
a. Study and Report Phase	\$1,148,290 .00	\$89,309.00		-
b. Preliminary Design Phase	-	-		-
c. Final Design Phase	-	-		-
c1. Final Design (Bid Package 1 and 2- Labor Rate x 3.15 multiplier)	-	-		\$113,479.
c2. Final Design (Bid Package 3 and 4)	-	-	\$3,572,447.	
c3.Permiting Services (Labor Rate x 3.15 multiplier)	-	-		\$318,479.
d. Bidding and Negotiating Phase	-	-		-
d1. Bidding and Negotiating Phase (Bid Package 1 and 2- Labor Rate x 3.15 multiplier)	-	-		\$31,736
d2. Bidding and Negotiating Phase (Bid Package 3)	-	-	\$82,499.	
e. Construction Phase	-	-		-
e1. Construction Office Services (Bid Package 1 and 2- Labor Rate x 3.15 multiplier)	-	-		\$140,800.
e2. Construction Field Services (Bid Package 1 and 2- Labor Rate x 2.35 multiplier	-	-		\$70,560.
f. Additional Floodplain Services (Labor Rate x 3.15 multiplier)	-	\$10,000.00		-
Sub Total	\$1,148,290.00	\$99,309.00	\$4,330,000.	
Contract Total	\$5,577,599.00			

* "Not-to-Exceed Fee" shall be the payment to the Engineer based on the actual Time and Materials effort expended. If the City pursues alternate means to complete the work than the standard design/bid/build process, and as a result the Engineer performs less than 100% of the identified scope of services, the Engineer shall prorate its fee for the Not-to-Exceed fee amount to include only those services provided. The fee shall not be exceeded unless the scope is amended in writing by both parties to materially increase the effort by the Engineer."

Exhibit A2 - Detailed Design Services

The City of Durham is upgrading the North Durham Water Reclamation Facility (NDWRF) and South Durham Water Reclamation Facility (SDWRF) to provide a variety of treatment facilities improvements as identified in the FY14 WRF Improvements Technical Memoranda for North and South Durham. Generally, this agreement includes final design services and bid period services for WRF upgrades as described herein. It is the intent of the Owner to amend this agreement at the end of the design period to include construction administration and resident project representative services for the period of construction of the proposed improvements. The detailed requirements for this future scope of work are not included in this exhibit. The Scope of Services for final design and bid period services below is presented as follows:

A. Scope of Services

1. General – Project Basis
2. Detailed Design Services
3. Hazardous Material Testing Services
4. Permitting Services
5. Bid Period Services
6. Construction Administration for first two bid packages

B. Project Schedule

C. Project Deliverables

The Engineer shall provide the following professional services for the orderly development of the Project:

A. SCOPE OF SERVICES:

1. GENERAL – PROJECT BASIS

The Owner intends to deliver this project in two phases with three bid packages in the first phase:

- Phase 1 Bid Package 1, (Control Panels) would begin construction in FY 2016
- Phase 1 Bid Package 2 (Berm Improvements) would begin construction in FY 2016
- Phase 1 Bid Package 3 would begin construction in FY 2017
- Phase 2 Bid Package 4 would begin construction in FY 2019

The Engineer shall provide preliminary design, detailed final design, bid phase services, and construction administration services for Bid Packages 1 and 2 of the FY14 Water Reclamation facilities Improvements. The Engineer shall provide preliminary design, detailed design, and bid phase services for Bid Package 3. The Engineer shall provide design through 30% for Bid Package 4 of the FY14 Water Reclamation Facilities Improvements.

a. General

- 1) Three separate construction contracts (Bid Packages 1, 2, and 3) shall be prepared for bidding under this contract. Bid Package 4 shall be designed through 30% design.
- 2) All design criteria listed herein is based upon previous recommendations of the Engineer from work under the FY14 Preliminary Engineering Reports except as specifically addressed. While criteria have been accepted in good faith by the Owner, the Engineer remains responsible for design of an effective and complete project to meet the objectives of the Owner. Engineer also remains responsible for providing a cost effective design for the Owner and is encouraged to propose changes to criteria when more cost effective criteria are identified. Proposed changes that are agreed to by the Owner may require formalization through amendment to this Agreement.
- 3) Notwithstanding the statement of any design criteria within this Agreement, it is the responsibility of the Engineer to provide a design in accordance with all written federal, state, and local laws and regulations in effect as of the date of this Agreement.

2. DETAILED DESIGN SERVICES

1. General – Provide detailed design for all facility upgrades and improvements, with components and features as described herein.
2. Process Mechanical Design – Develop detailed design of the process and mechanical equipment and associated components complete with piping, valves and ancillary items to provide a completely functional system.
3. Site work Design – Develop detailed design of all site grading, stormwater control, erosion and sedimentation control, paving, and curb and gutter for the project.
4. Yard Piping Design – Develop detailed design of all underground piping systems related to the work, including new yard piping related to new facilities, modifications to related existing piping, design of tie-ins to existing piping, modifications to eliminate piping conflicts and demolition and/or abandonment in place of impacted piping.
5. Hydraulic Profile – Develop a hydraulic profile that meets current and future proposed conditions under the major plant orientations including limited bypassing conditions of primary treatment and intermediate processes (e.g. floc tanks)

6. Structural Design – Develop detailed design for new facilities and modifications to existing facilities structures and related equipment lifting and superstructure components, as needed for a complete functional facility.
7. Architectural Design – Develop detailed design for new superstructures and other components as needed to accommodate the planned improvements, including the new SDWRF influent fine screening and grit removal facilities, the new SDWRF RAS pump station, and the new electrical buildings at both WRFs.
8. HVAC Design – Develop detailed design of HVAC systems for the new SDWRF influent fine screening and grit removal facilities, the new SDWRF RAS pump station, and the new electrical buildings at both WRFs.
9. Electrical Improvements – Develop detailed design for the electrical distribution system to provide normal and stand-by power to the NDWRF and SDWRF facilities being provided under this contract. Stand-by power and reliability requirements shall be fully addressed. Wire and cables will be placed in cable trays where possible and prudent to facilitate maintenance. Perform an arc flash analysis only in so far as it is required by best practices in design. A formal plant wide arc flash study and labeling is not included in this scope.
10. Instrumentation and Control System – Develop detailed design of instrumentation and controls to allow monitoring and control of the new facilities and upgraded existing facilities from the existing plant-wide control system.
11. Opinion of Cost – Cost control, and maintaining the overall project cost within the Owner's project budget is a very important part of this project. Develop and maintain a detailed cost estimate throughout the final design of the work. Formal construction cost estimates shall be provided with the 60% and 90% and Bid-ready submittals. Promptly identify any cost impacts resulting from design decisions made by the Owner and communicate such impacts to Owner.
12. Sole Source Procurement - Negotiate scope and costs for the following equipment items: Siemens Blower Panels, Eutek HeadCell, Beck actuators, selected UV Equipment, and Invent Mixers. Engineer shall provide a sole source justification memo for City Council approval.
13. Specifications – Develop detailed specifications for all aspects of the work such that the project results in a complete, working facility. Identify any sole source equipment items. The general contract provisions shall be in the form of the 2002 EJCDC "Standard General Conditions of the Construction Contract", including modifications provided by the City of Durham, and shall be supplemented with provisions specific to the project requirements.
14. The following facilities shall be designed using 3D CAD software to facilitate the City's input into the preliminary layout. All other facilities shall be designed in

conventional 2D. The 3D model shall be maintained through 90% design. The 2D deliverables at 60% and beyond will be derived from the 3D model and discipline construction details will be prepared in 2D. Major electrical equipment items such as MCCs will be modeled in 3D, but details such as conduit routing, fixture locations, etc. will be shown in 2D using cuts from the model as background.

Bid Package 3: NDWRF Plant B Influent Screening Facility
SDWRF Influent Screening & Grit Removal Facilities
SDWRF RAS Pump Station 3

Bid Package 4 (Phase 2): NDWRF Camden Road/Drain Pump Station (30% Design under this contract)

15. Detailed Facilities Design – Phase 1, Bid Package 1 – Control Panel Replacements – Provide detailed contract drawings with appropriate level of detail to allow bidding and construction of the planned facilities improvements as described below. It is anticipated this project is will have an allowance for a Systems Integrator.

1. NDWRF BFP and GBT Control Panel Improvements – The existing control panels for the belt filter presses and gravity belt thickeners in the solids handling building have become unreliable due to corrosion of internal components. Design replacement of these control panels, including reconnection of existing power and control wiring and integration into the existing plant SCADA system. Evaluate use of control panels provided by Original Equipment Manufacturers versus custom designed panels.
2. NDWRF Blower Control Panel PLC Replacement – The existing control panels for the Siemens (Turblex) single stage centrifugal blowers contain PLCs that have become obsolete. Design replacement of PLCs from with replacement panels from Siemens (Turblex). Include reconnection of existing power and control wiring and integration into the existing plant SCADA system. Include PLC programming for impending surge, interface with DO control program, and limitations on number of operating blowers. Develop a plan for installation, testing and turnover of the upgraded blower panels one at a time while maintaining continuous aeration of the NDWRF process with other existing blowers.

16. Detailed Design – Phase 1, Bid Package 2 – Flood Protection Berm Improvements – Provide detailed contract drawings with appropriate level of detail to allow

bidding and construction of the improvements to the flood protection berm on the North Side of Plant A.

1. Berm Improvements- The proposed berm improvements are anticipated to be accomplished by adding earthen embankment where possible. However there are three areas where utilization of a reinforced concrete wall is anticipated due to the location of existing facilities. The design of the proposed berm improvement will require site plan approval from the Durham City-County Planning Department (work to be performed under Section 4, Permitting Services, below). A pre-submittal conference will be conducted at or before 60% design to confirm that Level 2B SP is the appropriate site plan type and to determine the required departmental reviews.

Engineer will coordinate the proposed berm with existing site facilities. Engineer will conduct a workshop to review alignment and technical issues, decisions that must be made and the Engineer's recommendations for the Owner's consideration. The Engineer will also conduct a field meeting and review the recommended alternative with the Owner.

The final design will be developed for the alternative preferred by the Owner. The construction drawings will present grading plans as well as section views and profiles for the earthen embankment improvements. Detail demolition plans, erosion control drawings, landscaping drawings, architectural drawings, and structural drawings with supporting details will also be provided as necessary. A roadway plan and profile for the driveway improvements including a traffic control plan for the work immediately adjacent to East Club Blvd will also be developed. Detail Specifications will support the construction drawings as necessary.

17. Detailed Facilities Design – Phase 1, Bid Package 3 – Provide detailed contract drawing sets for each Water Reclamation Facility with appropriate level of detail to allow bidding and construction of the planned facilities improvements as described below.

- 1) Facilities Design for the NDWRF Improvements

1. NDWRF Aeration Basins Fine Bubble Diffuser Upgrades – The existing aeration basin fine bubble diffuser systems are to be replaced with new equipment. Design new aeration grids for Aeration Basins 1-5. The grid in Aeration Basin 6 is already installed with the appropriate diffuser holder density and will not

require replacement in this project. Diffuser membranes shall be replaced in all aeration basins with an appropriate diffuser density and taper to minimize energy requirements while maximizing treatment. Include aeration basin cleaning improvements via jet nozzles in trench drain similar to Aeration Basin 6.

2. NDWRF Plant B Odor Control Rehabilitation – Design upgrades required to ventilate proposed NDWRF Screening Facility for corrosion control through the Plant B odor control facility. This is anticipated to involve modification or replacement of the odor control fan. Develop air flow balancing SOP and specify that the Contractor balance the system to achieve proper ventilation of each connected service.
3. NDWRF Plant B Influent Screening Facilities – Provide detailed design of a new Plant B screening facility with a capacity of 60 mgd for a current peak flow and a future peak flow of 90 mgd. The fine screening facility shall include two duty centerflow band screens with built-in bypass via electrically actuated back plates, a bypass channel that can be converted to a screening channel in the future to achieve the 90 mgd capacity rating, and influent flow measurement via magnetic flow meters. Screenings shall be conveyed to a screenings washing/dewatering unit and discharged to dumpsters in the general vicinity of the parking area adjacent to the grit dumpster access area. The design shall take into account future off-site flows entering the NDWRF and future expansion of the Plant B grit removal facilities, and shall coordinate with the City to determine construction sequencing considering the new flows from the proposed SE Regional Pump Station. Major equipment and influent flow shall be monitored through the City's existing SCADA system. Design the equipment installation, including provisions for equipment removal, to facilitate the Owner's specific maintenance approach. The channels and screening equipment will be odor scrubbed. No superstructure is anticipated around the screening structure as part of this project; however, the structure will be designed to accommodate a single-story building in the future. Control equipment in the grit building electrical room will be relocated to the new screenings electrical room or building as determined in final design; existing major electrical equipment will remain in the grit electrical room.
4. NDWRF New Secondary Clarifiers – Design two new 160-foot diameter secondary clarifiers as part of the NDWRF Plant B liquid treatment train. The clarifiers shall have stainless steel unitube header style collection mechanisms and will have full-radius scum

skimming with chopper pumps located in the centerwell. The RAS pumping equipment for these clarifiers shall be incorporated into the existing Plant B RAS Pump Station. Improvements in the RAS Pump Station include provisions for transporting RAS pumps in and out of the RAS Pump Station, replacing all mag meter controllers, replacing the wall-mounted AC unit in the Electrical Room, and re-coating interior walls and pipes as necessary. Include design of flow distribution boxes at the existing Aeration Basin Effluent Channel to proportionately distribute flow to all in-service clarifiers.

Provide solids distribution improvements via mixing in the Aeration Basin Effluent Channel and/or shortening the secondary clarifier distribution weirs. Effluent piping from the clarifiers shall be routed to the existing tertiary filter facilities. RAS piping from the secondary clarifier underdrains shall be routed to the RAS Pump Station. Secondary scum removal and pumping facilities shall connect to the existing scum yard piping. The effluent troughs shall be provided with covers to limit algae growth and weir cleaning requirements. Electrical feed to these facilities shall be from the existing RAS Pump Station and equipment controls shall be integrated into the existing SCADA system in the RAS Pump Station. The site for the new secondary clarifiers is in the area of the existing sand drying beds. The Engineer shall develop the site to provide ease of access to the clarifiers and shall retain, to the extent practical, the functionality of a portion of the newer set of existing sand drying beds while addressing standing water issues by re-grading areas where drying beds are demolished. Consider lowering construction costs by planning for limited demolition that would not involve removing all concrete, but would address standing water issues. Design associated chemical feed as follows:

- a. Polymer Feed System Upgrades (Liquid Treatment Train) – Design yard piping to extend polymer feed from polymer pumping equipment (to be provided in the Chemical Systems and Nutrient Related Improvements project) to the injection points upstream of the new secondary clarifiers. The polymer piping shall be designed in carrier pipes consistent with the other on-site chemical piping.
- b. Alum Feed System Upgrades – Design alum pumps and yard piping to extend alum feed to the injection points downstream and upstream of the new secondary clarifiers. The alum piping shall be designed in carrier pipes consistent with the other on-site chemical piping.

5. NDWRF Side-Stream Equalization Facilities The existing Plant A Intermediate Settling Tanks 1-6 shall be reconfigured to serve as equalization and future sidestream treatment of filtrate. Filtrate piping at the existing belt filter presses shall be modified to capture the filtrate separate from the belt filter press washwater. Piping shall be provided to route filtrate to the sidestream treatment equalization tanks. The equalization effluent shall drain back to the Camden Road Pump Station.
6. NDWRF Polymer Feed System Upgrades (Solids Handling Facilities) – Design replacement of the existing polymer system with a direct feed, skid mounted emulsion polymer system. Demolish existing dry preparation system, dilute polymer feed pumps, dilution assemblies, and related equipment. Utilize existing polymer storage tanks (currently used for reclaimed water). No age tanks are anticipated. Develop sequence of construction to allow continuous thickening and dewatering. New controls shall be provided and be integrated into the existing plant SCADA system. Include re-coating of interior walls in entire Solids Handling Building. Design loading and unloading improvements, HVAC upgrades and general lighting improvements.
7. NDWRF Aeration Basin Influent Channel Mixing – Design replacement of mixing system for the Aeration Basin Influent Channel. This design scope of services is based on replacement of the existing mixers with the Inven low-energy mixing equipment or vertical turbine mixers. The designs shall include an appropriate number and size of mixers to maintain solids in suspension while minimizing energy input and shall address operational flexibility and accessibility, and mechanical, electrical, and instrumentation issues for a complete operational design.
8. NDWRF Stormwater Management and Site Considerations – Remove stormwater flow to plant from sludge storage pad cover. Flow currently enters the Plant A Primary Clarifier effluent channel, and the City received credit for nutrient removal through the plant. Design stormwater management BMPs to comply with nutrient reductions required from disconnecting sludge pad cover as determined by the City of Durham Area of Concern method. Design dry detention basin to reduce peak flows as required by NC administrative code. Coordinate location of BMPs with future land uses. Replace asphalt parking lot at Administration Building with concrete parking lot.

9. NDWRF Demolition- Design demolition of the following structures: Plant A RC Blower Building, Plant A Thickening Building, Plant A Screw Pump Station, Canopy and Shed near UV Facility, Old Drying Beds (not demolished as part of clarifier construction). This may be an alternate bid item depending upon available budget and impact to stormwater impervious surface calculations.
- 2) Facilities Design for the SDWRF Improvements
1. SDWRF Polymer Feed System Upgrades (Solids Handling Facilities) – Design replacement of the existing polymer system with a direct feed skid mounted emulsion polymer system. City shall confirm if condition of existing 6,000 gallon polymer storage tank is suitable for use with dewatering polymer. Design rehabilitation of existing tank or a new tank. Design thickener emulsion polymer system that will be provided with three totes that can be fed from the existing/new 6,000 tank or replaced with totes of a different polymer if required. No age tanks are anticipated. Develop sequence of construction to allow continuous thickening and dewatering. New polymer controls shall be provided and be integrated into the existing plant SCADA system.
 2. SDWRF Equalization Facilities – Design a new diurnal equalization facility at the SDWRF consisting of a single new 2 million gallon diurnal equalization tank to be located near the new Preliminary Treatment Facility. Piping will be provided to route primary effluent to the equalization tank by gravity and a flowmeter and control valve will regulate flow into the tank. The tank shall be situated relative to the Influent Pump Station to allow gravity flow from the equalization tank to the Influent Pump Station by piping with a flowmeter and control valve to regulate flow to the Influent Pump Station. Include mixing and/or cleaning equipment. Provide controls to allow the equalization volume to be used for ammonia load equalization. Design the equipment installation to provide functional flexibility, including strategies for equipment removal and maintenance. Control strategies shall be developed to provide for ammonia load-based equalization of dry weather flows. The design will allow for use of a truss-style cover with ducts for odor control in the future. Develop the site to provide ease of access to the new equalization facilities.
 3. SDWRF Aeration Basins Fine Bubble Diffuser Upgrades – The existing aeration basin fine bubble diffuser systems are to be

replaced with new equipment. Design new aeration grids for Aeration Basins 1-8 with the appropriate diffuser holder density for dual zone DO control. Diffuser membranes shall be replaced in all aeration basins with an appropriate diffuser density and taper to minimize energy requirements while maximizing treatment. Improvements to basin draining shall include adding permanent sumps and a portable drain pump in Aeration Basins 1-4. In Aeration Basins 5-8, the mixed liquor recycle pump discharge piping and related pump upgrades (as necessary) shall be modified so that mixed liquor may be pumped to the Aeration Basin Influent Channel when the Aeration Basins are being drained. Evaluate cost effective alternatives including additional hydrants and spray headers to provide more effective cleaning of the basins. Include addition of nitrate probes in the post-anoxic zones and real time process control for process optimization.

4. SDWRF Influent Screening & Grit Removal Facilities – Design a new fine screening and grit removal facility incorporating the fine screening and grit removal technologies selected during the Basis of Design phase. The combined fine screening and grit removal facility shall be designed to treat a design flow of 20 mgd and a peak hydraulic flow of 75 mgd. The fine screening facility shall include three duty centerflow band screens with built-in bypass via electrically actuated back plates. Flow will be measured by Parshall Flume in each screenings channel. Screenings shall be conveyed through a common sluice to two screenings washing/dewatering units and discharged to a dumpster area along with grit material. The grit removal configuration shall consist of three Eutek HeadCell grit collectors, grit pumping equipment with redundant pumps, and grit separation and dewatering equipment. Grit material shall be discharged to a common dumpster area with the screening material. It is anticipated that the screening and grit removal facility will be enclosed in a masonry and brick building to match the existing plant architecture and that the interior of the spaces will be odor scrubbed. The electrical facilities for this building shall be accessible without entry through the potentially odor generating spaces. Major equipment and influent flow shall be monitored through the City's existing SCADA system. Develop construction sequencing to maintain plant and sewer system operations, and include demolition of the existing grit systems after new headworks is functional, and maintain use of the existing septage receiving facility.
5. SDWRF Headworks Odor Control– The new Influent Screening and Grit Removal building will require new odor control, and options including chemical scrubbing and biofiltration will be

evaluated. Develop air flow balancing SOP and specify that the Contractor balance the system to achieve proper ventilation of each connected service. Evaluate consolidation of odor control facilities for solids handling with the proposed headworks odor control facility.

6. SDWRF Secondary Clarifier Improvements –This scope is based upon designing one new 160-foot diameter secondary clarifier and designing a second clarifier to 30% completion. A new RAS pump station will be designed with vertical turbine solids handling pumps. The new RAS Pump Station shall be configured so that the RAS flow from each clarifier can be dedicated to one pump by opening or closing submerged gates. Access to pumps will be addressed. No building or canopy will be included over the pumps, but a separate pre-fabricated building with a masonry veneer will be included for electrical and control gear sized to accommodate current and future clarifiers and RAS pumps. The electrical building will include a subterranean concrete vault or other means to access wires and conduit. The clarifiers shall have stainless steel unitube header style collection mechanisms and will have full-radius scum skimming with chopper pumps located in the centerwell. At least three of the existing Secondary Clarifiers 1-4 and RAS Pump Station 1 will remain in service until the second 160-foot clarifier is constructed. Include the design of flow distribution boxes at the existing aeration basin effluent channel to proportionately distribute flow to all in-service clarifiers. Secondary scum removal and associated pumping facilities shall be integrated with the existing scum pumping facilities. The effluent troughs shall be provided with covers to limit algae growth and weir cleaning requirements.
7. SDWRF Tertiary Filter Media Replacement and Improvements – Design replacement of the filter media in the existing traveling bridge filters with new anthracite and sand. Catalog parts of filters requiring replacement in next 10-15 years and design replacement of those parts. Include requirement for inspection of filter underdrains by manufacturer when media is removed during construction with unit cost for rehabilitation of damaged parts. Design modifications to effluent and bypass weirs to allow full filter backwash prior to peak flow events to reduce frequency of filter bypass events.
8. SDWRF Aeration Influent Channel Mixing Improvements – Design replacement mixing system for the aeration basin influent channel. This design scope of services is based on replacement of the existing mixers with the Invent or vertical turbine mixers. The

design shall include an appropriate number and size of mixers to maintain solids in suspension while minimizing energy input and shall address operational flexibility and accessibility, and mechanical, electrical, and instrumentation issues for a complete operational design. Develop a construction sequencing approach for equipment installation, and provide for easy equipment access and removal for routine maintenance.

9. SDWRF Stormwater Improvements – Design site stormwater drainage and BMPs required for the new facilities to be provided on the SDWRF site. Provide stormwater and pavement design as required to accomplish these improvements.
10. SDWRF Ultraviolet (UV) Disinfection Facility- A Technical Memorandum will be prepared for this task discussing alternative UV equipment, reviewing facility location, hydraulic profile, and design parameters including UVT and Dose. Multiple types of UV equipment will be described and compared, including the Trojan UV3000Plus and Signa products, the Ozonia Aquaray 3X, and the Wedeco Duron. Sleeve cleaning, equipment access, and expected replacement schedule for lamps and ballasts will be compared. The hydraulic profile will be evaluated considering current facilities and a future deep bed filter facility located to the east of the existing filters. Locations for new on-site reclaimed water (RCW) pumps will be evaluated as will a connection point to allow use of potable water as an emergency backup.

A competitive equipment pre-selection will be completed after the Technical Memorandum is reviewed by the City. Engineer will develop detailed technical equipment specification with support technical specification to be included in a Request for Proposals from UV equipment manufacturers. Firm equipment costs quotes and guaranteed power use and replacement part prices (tied to index) will be requested in the RFP. Engineer will work with City to determine selection criteria that may include equipment cost, annual costs, equipment features, ease of operability, ease of maintainability, safety, references, and number of installations in the United States and/or abroad, and other factors as decided by the City. One model of UV equipment will be selected for detailed design, but this contract may be amended to allow for final design of UV facilities for two or more types of UV equipment.

Final design will be for the UV equipment chosen as part of the competitive pre-selection. It is anticipated that the UV facility will

be located outdoors with a canopy, similar to the North Durham UV facility. Facility shall be designed to treat a peak flow of 60 mgd to meet effluent permit limits and to pass a peak hydraulic flow of 75 mgd, and shall be expandable by building future channels in the future to treat more flow or to more stringent limits. Develop a construction sequencing approach for construction of new facility and tie-ins with existing facilities. Design new RCW pumps and tie in to existing distribution network. The existing UV facility will be demolished after construction.

18. Detailed Facilities Design – Phase 2, Bid Package 4 – Provide 30% review drawing sets, major equipment specifications, cost estimate, and cut sheets (as described in Section C) for the planned facilities improvements as described below.

- 1) The 30% drawings will include the following:
 1. Cover Sheet and Index of Drawings
 2. Site/Civil sheets showing horizontal and vertical controls, floodplain and floodway, existing and proposed facilities, existing and proposed roads, existing grading, setbacks/buffers, and stormwater facilities.
 3. Process Mechanical sheets showing the hydraulic profile, existing yard piping and proposed major process piping, and basic facility plans and sections (for 2D facilities) or 3D model.
 4. No structural sheets will be included. Structural will review wall thickness and column and beam locations.
 5. No architectural sheets will be included. Architectural will identify applicable building codes and planning requirements.
 6. Electrical sheets showing an overall plant electrical single line diagram and overall site plan.
 7. Instrumentation sheet showing the control system architecture.
 8. No HVAC sheets will be included. HVAC will identify applicable codes and requirements and review room sizes for HVAC equipment.
- 2) Facilities Design for the NDWRF Improvements
 1. NDWRF Conversion of Plant A Clarifiers to Equalization – The three Plant A secondary clarifiers shall be repurposed for equalization volume at the NDWRF. Design scope items for converting the tanks to equalization include: demolition of secondary clarifier mechanisms and scum pipes/beaches, modifications to level instrumentation and influent flow control, new influent gates, and the replacement of the pressure relief valves. Design modifications to piping to allow primary effluent

flow to be diverted from the Plant B flow distribution box or from the Plant A primary effluent to the converted Plant A equalization tanks shall be included. Also include piping modifications to route equalization drain to the proposed Camden/Drain Pump Station in Item 2 below. Additional piping modifications include adding isolation valves to each drain pipeline. No mixing is anticipated in the equalization tanks. Design shall be completed to 30% under this contract.

2. NDWRF Camden Road Pump Station – The Camden Road Pump Station shall be demolished and replaced with a new Camden Road/EQ Return Pump Station to pump flow from Camden Road, as well as equalization effluent upstream of the influent screens on Plant A. The pump station shall be equipped with vertical turbine solids handling pumps or submersible pumps sized to replace the pumping capacity of the Camden Road Pump Station and to service the equalization basins. Evaluate location of pump station with regards to accessibility and ability to reuse the existing gravity sewer and force main to the greatest extent possible so as to not disturb the flood protection berm and wall. Develop construction sequencing construction sequencing to maintain plant and sewer system operations. Circular or trench style wet wells will be evaluated. Incorporate improvements to address equipment removal and the Owner's preferred maintenance approach. Design shall be completed to 30% under this contract.
3. NDWRF Equalization Tank Mixing – Design improvements to the existing 4.0 MG Equalization Tank to include mixing equipment to improve solids suspension when the equalization tank is in service. The mixing equipment shall be designed to mix the bottom cone portion of the tank with jet mix-style equipment and self-priming chopper pumps with suction drawing from the existing 18-inch drain line. Design modifications to the drain piping to convey equalization drain to the Plant A influent screens. Include the replacement of the level sensor for accurate level measurement in cone volume. Design the equipment installation to provide functional flexibility, including strategies for equipment removal and maintenance. Include improvements in the 24-inch meter vault to replace the existing plugged floor drain the conduit and wire, painting and coating inspection and rehabilitation. Design shall be completed to 30% under this contract.
4. NDWRF Odor Control Rehabilitation – Testing shall be conducted on-site to determine major sources of odor (i.e. Plant A primary clarifier weirs) and guide comparison of technologies to mitigate

odors. An evaluation of odor dispersion will be conducted to determine whether cost-effective improvements to odor control facilities are available or not. The life cycle cost to refurbish odor control facilities for the Plant A preliminary treatment facility and the Solids Handling Building and construct chemical systems for caustic and hypochlorite will be compared with the life cycle costs of using biofiltration and optional carbon polishing for odor control. The life cycle cost to refurbish odor control facilities serving the Plant B grit, proposed screening facility, and primary clarifiers and use caustic and hypochlorite will be compared with the life cycle cost of biofiltration and optional carbon polishing. Design the equipment installation to include provisions for equipment removal and the Owner's desired maintenance approach for maintaining this equipment. Incorporate upgraded instrumentation to automate and ease monitoring of this facility. Under this contract, the Engineer shall perform a full assessment of the existing ductwork on Plant A and Plant B and determine the extent of required replacement of ductwork. Evaluate air change rates and intake and exhaust register placement to determine effectiveness of the existing ventilation design. Develop air flow balancing SOP and specify that the Contractor balance the system to achieve proper ventilation of each connected service. Design shall be completed to 30% under this contract.

5. NDWRF Plant A Primary Settling Tank Improvements – Design replacement top and bottom rails for the Plant A Primary Settling Tanks mechanisms. Design replacement primary sludge pumps, piping, valves, and flow meters. Include provisions for re-coating interior walls of primary sludge pump station building. Design emergency pumping bypass to allow the Owner to connect temporary pumping facilities to the Low Lift Pump Station discharge force main for use if the Low Lift Pump Station is out of service. No wetwell concrete rehabilitation is contemplated as part of this work. Design shall be completed to 30% under this contract.
6. NDWRF Tertiary Filter Facility Upgrades – Design services provided as part of this scope include upgrade of the Tertiary Filter Facility from dual-media to deep bed mono-media sand, which would allow for lower backwash volume, improved solids removal and future denitrification operation. Filter modifications include the removal and disposal of existing dual-media and support gravel, new support gravel, new coarse monomedia, replacement of filter backwash air valves and actuators, replacement of filter influent valve actuators, No improvements are anticipated to the backwash blowers or to the backwash pumps. Include requirement

for inspection of filter underdrains by manufacturer when media is removed during construction with unit cost for rehabilitation of damaged parts. The interior walls of the pipe gallery will be re-coated. Design shall be completed to 30% under this contract.

7. NDWRF Side-Stream Nutrient Reduction Facilities –This scope for detailed design is based on design of either the Kruger AnitaMox or World Water Works DEMON deammonification sidestream treatment to the NDWRF sidestream treatment process. The Engineer will work with City to select one manufacturer prior to 30% design. The new deammonification sidestream treatment facilities will treat dewatering filtrate from the existing Solids Handling Building to reduce the ammonia and total nitrogen loads to the NDWRF BNR process. Sidestream treatment will return the treated filtrate flow to the treatment process downstream of the primary clarifiers via the Low Lift Pump Station. The existing Plant A Intermediate Settling Tanks 1-6 shall be reconfigured to serve as equalization and treatment tanks for this process. Process air will be provided from the main blower facilities at Plant B. The equalization portion of the tankage shall be covered but not odor scrubbed. Filtrate piping at the existing belt filter presses shall be modified to capture the filtrate separate from the belt filter press washwater. Piping shall be provided to route filtrate to the sidestream treatment equalization tanks. Motorized valves shall be provided to allow filtrate to bypass the sidestream treatment process during startup and shutdown of the dewatering process. The process electrical facilities for this system will be located in the Plant A electrical building (or Solids Handling Building as determined in final design), and the control panel will be at the treatment tanks. A caustic storage and feed facility will be provided for sidestream treatment and Plant A odor control. Major equipment, influent flow to the process, etc. shall be monitored through the City's existing SCADA system. Design shall be completed to 30% under this contract.
8. NDWRF Plant A Caustic Storage and Feed – A caustic feed facility will be provided for Plant A odor control and sidestream treatment. The existing Engine Blower Building will be evaluated to determine suitability to house caustic storage and feed as will alternate sites on A side. Storage tank size, material of construction, and installation will be considered. Metering pumps will be Watson Marlow to match pumps installed under the Chemical Systems Project. Design shall be completed to 30% under this contract.

3) Facilities Design for the SDWRF Improvements

1. SDWRF Dewatering Capacity Improvements – The SDWRF solids handling building includes three belt filter presses, one of which has not provided reliable service. Develop a detailed design for replacement of this equipment with a new belt filter press similar in size and function to the existing equipment and fitting into the existing space. New belt filter press control panels shall also be provided for the two remaining BFPs and integrated into the existing plant SCADA system. Replace failed and obsolete gravity belt thickener controls and instrumentation. Review operator control needs and provide information and control and evaluate appropriate location. Evaluate use of remote technology such as Wonderware InTouch Access Anywhere. Evaluate WAS and GBT Feed Pumps and controls to allow for control of GBT feed while still maintaining the options to use the gravity thickener next to Aeration Basin 1 and run (2) GBTs simultaneously. Provide new console and computer in the Solids Handling Building control room and CCTV to monitor the BFPs and truck loading. Demolish sludge/polymer mix tank at BFP 1 and 2 and design replacement piping to allow better access to presses. Design loading and unloading improvements, HVAC upgrades and general lighting improvements. Include re-coating of interior walls in entire Solids Handling Building. Design shall be completed to 30% under this contract.
2. SDWRF Odor Control Rehabilitation – Testing shall be conducted on-site to determine major sources of odor and guide comparison of technologies to mitigate odors. An evaluation of odor dispersion will be conducted to determine whether cost-effective improvements to odor control facilities are available or not. The odor control facilities that serve the SDWRF influent pump station, preliminary treatment facilities, primary settling tanks, primary scum building and the solids handling buildings shall be upgraded and refurbished. Under this contract, the Engineer shall perform a full assessment of the existing ductwork on and determine the extent of required replacement of ductwork. Compare the life cycle costs of rehabilitating chemical scrubbers and associated hypochlorite feed via tablet chlorination with changing odor control technology to biofilters and optional carbon polishing. Caustic will be provided from the new caustic storage and feed facility to be constructed under the Chemical Systems and Nutrient Related Improvements project. Design the equipment installation to include provisions for equipment removal and the Owner's desired maintenance approach for maintaining this equipment. Incorporate upgraded instrumentation to automate and ease monitoring of this facility. Evaluate air change rates and intake

and exhaust register placement to determine effectiveness of the existing ventilation design. Develop air flow balancing SOP and specify that the Contractor balance the system to achieve proper ventilation of each connected service. Design shall be completed to 30% under this contract.

19. Conduct a series of design review workshops to discuss technical issues, decisions that must be made and the Engineer's recommendations for the Owner's consideration. Provide drawings, visual aids and concise data to assist the Owner in the understanding of issues and the decision-making process. The following is a summary of the topics anticipated to be covered in these workshops; several topics may be consolidated into single meetings:

- 1) 90% Bid Package 1 Control Panel Replacement Review
- 2) 60% Bid Package 2 Berm Improvements Review
- 3) SD UV Disinfection Equipment Options Review
- 4) SD and ND Odor Control Alternatives Review
- 5) SD UV Disinfection Equipment Pre-Selection Workshop

- 6) 30% North Durham Screening Facility Review (3D Model)
- 7) 30% North Durham Sidestream Treatment Review
- 8) 30% North Durham Aeration Basin and Channel Mixing, Secondary Clarifiers and Other Facilities Review
- 9) 30% North Durham Major Equipment Cutsheet Review
- 10) 30% North Durham Phase 2 Facilities Review
- 11) 60% North Durham Screening Facility Review (3D Model and Drawings)
- 12) 60% North Durham Sidestream Treatment Review
- 13) 60% North Durham Aeration Basin and Channel Mixing, Secondary Clarifiers and Other Facilities Review
- 14) 60% North Durham Electrical Review
- 15) 90% North Durham Screening Facility Review (3D Model and Drawings)
- 16) 90% North Durham Sidestream Treatment Review
- 17) 90% North Durham Aeration Basin and Channel Mixing, Secondary Clarifiers and Other Facilities Review

- 18) 30% South Durham Headworks Facility Review (3D Model) and Equalization
- 19) 30% South Durham Aeration Basin, Channel Mixing, and Secondary Clarifiers Review
- 20) 30% South Durham Polymer Feed, Tertiary Filters, UV, and Other Facilities Review
- 21) 30% South Durham Major Equipment Cutsheet Review
- 22) 30% South Durham Phase 2 Facilities Review

- 23) 60% South Durham Headworks Facility Review (3D Model and Drawings) and Equalization
 - 24) 60% South Durham Aeration Basin, Channel Mixing, and Secondary Clarifiers Review
 - 25) 60% South Durham Polymer Feed, Tertiary Filters, UV, and Other Facilities Review
 - 26) 60% South Durham Electrical Review
 - 27) 90% South Durham Headworks Facility Review (3D Model and Drawings) and Equalization
 - 28) 90% South Durham Aeration Basin, Channel Mixing, and Secondary Clarifiers Review
 - 29) 90% Polymer Feed, Tertiary Filters, UV, and Other Facilities Review
20. Conduct an electrical walk-around workshop with appropriate City and Engineer personnel at each of the WRFs near the 30% submittal to ensure that the ENGINEER gains a full understanding of the plant engineering, operations and maintenance groups needs related to design of the proposed facilities.
21. Conduct an O&M workshop between the 30% and 60% review milestones with a focus on operations personnel for operability issues and maintenance personnel for maintainability issues and expectations. Present proposed approaches for lifting, removal, access, valve operation, regular maintenance, backup manual operation, orientation and location of equipment. Identify the planned approaches for equipment access, reading of instruments, adjustments of settings, replacing lights, etc. such that the operations and maintenance staff can provide input into the design of these features. All operations and maintenance comments shall be documented, reviewed with the Owner and resolved in the documents.
22. Conduct a constructability review of the project at the 90% complete milestone to identify any issues that need to be addressed to ensure clarity for bidders and to ease the construction of the work. The Engineer shall provide a constructability review team that has not had direct involvement in the design in order to provide a fresh perspective. All constructability comments shall be documented, reviewed with the Owner and resolved in the documents.
23. The Engineer shall prepare meeting minutes for Project meetings and such minutes shall specifically identify if/when decisions made in meetings significantly impact the project cost or schedule. Written meeting minutes shall be submitted to the Owner not more than 15 days after the meeting.

24. The Engineer shall assist the City in procuring a Systems Integrator for Bid Package 3. The procurement shall be qualifications based and shall include a cost component such as hourly rates. Engineer shall negotiate integrator scope and price for each bid package during final design.
25. Provide a decision-making log for all decisions that must be made in the course of completing the work, identifying the decision to be made, decision-making responsibility, date the decision need is first identified, date the decision is made. Provide an update to this log at the beginning of each meeting and identify critical path issues. Assist the Owner in developing a plan for issue resolutions to maintain the project schedule.

3. HAZARDOUS MATERIALS TESTING SERVICES

1. All Hazardous Materials Testing services shall be provided by a sub-consultant to Hazen and Sawyer.
2. NESHAP Asbestos Building Inspection – Asbestos inspection will be performed on the NDWRF RC Blower Building, NDWRF Thickening Building, and NDWRF Plant A Screw Pump Station.
3. Lead-Based Paint Inspection

A lead-based paint inspection will be performed on the NDWRF Intermediate Settling Tank mechanisms, NDWRF Plant A Secondary Clarifier mechanisms, NDWRF RC Blower Building, NDWRF Thickening Building, NDWRF Plant A Screw Pump Station, and on the SDWRF Secondary Clarifier mechanisms (Clarifiers 1-4). Once arrangements have been secured to access the structures, a certified, licensed Lead-Based Paint Inspector will visit the property in order to complete the fieldwork necessary for the performance of a Lead-Based Paint Inspection. Completion of this fieldwork will include the following:

- 1) Visually inspecting visible interior/exterior painted surfaces of each structure to evaluate the number of lead-based paint testing combinations.
- 2) Based upon the visual inspection, a sampling plan will be devised in accordance with regulatory sampling protocols. Following preparation of the sampling plan, an X-Ray Fluorescence (XRF) Analyzer will be used to measure the lead content within all surfaces designated in the lead based paint sampling plan. It is understood that it may be necessary to collect paint chip and/or substrate samples from the building/structure. Collection of soil or drinking water samples at the sites is not included.

- 3) It may be necessary to gain access into a hidden area or area where there is no access key or other means which would allow for normal access. Neither the Engineer, nor its sub-consultant, A-1 Consulting, Inc., is responsible for performing repairs to building materials sampled as part of the Lead-Based Paint Inspection. All work shall be done in compliance with applicable regulations, including, but not limited to, OSHA, such that post-sampling conditions do not create hazards or violations.
- 4) The following additional tasks related to the Lead-Based Paint Inspection will be performed:
 - a) Prepare a Lead-Based Paint Inspection report for each structure detailing information obtained during the Lead-Based Paint Inspection and including laboratory analytical results. The report will include abatement design recommendations for the safe and proper removal and disposal of identified lead based paint at the site.

4. PERMITTING SERVICES

1. The Engineer shall provide assistance in obtaining permits required for bidding Bid Packages 1, 2, and 3. Assistance shall include preparation of permit submittal forms to accompany design documents, meetings with permitting agencies and City staff, and responding to permitting agency comments. As the level of effort required to obtain all permits for the project is difficult to predict, this sub-task will be completed on a time and materials basis with an initial not to exceed limit as shown in the Table below. The City shall pay Hazen and Sawyer for all permit submittal fees levied by the permitting review agencies out of the additional services allowance.
2. Projected permits include:
 - 1) NC DWQ Authorization To Construct (ATC)
 - 2) ACOE (permits are not anticipated under this amendment)
 - 3) NCDENR Erosion and Sedimentation Control(for Bid Packages 2 and 3)
 - 4) DOT Encroachment Agreements (for Bid Packages 2 and 3)
 - 5) Special Use Permit update for South Durham
 - 6) City of Durham Site Plan Process (for Bid Packages 2 and 3)
 - 7) City of Durham Development Review Board (DRB) Approval
 - 8) Letter of Map Revision (LOMR) from the NCFPM

5. BID PHASE SERVICES

1. Bid Document Administration – The Engineer shall assist the Owner with preparing an advertisement for bid and coordinate distribution of contract documents for bidding to all bidders and plan houses such as Dodge Report, AGC, etc. It is acknowledged that the Engineer will sell plans to potential bidders and vendors, and that the purchase of plans shall be non-refundable.
2. Pre-Bid Conference – The Engineer shall make a formal presentation of the project at the pre-bid conference and be available to answer contractor questions/comments regarding the work.
3. Prepare Addenda – The Engineer shall receive contractor questions regarding the work, investigate and prepare appropriate answers in addendums to the contract documents. Responses shall include modifications to the documents, supplemental specifications and/or drawings as required to clearly communicate the intent of the work.
4. Evaluate Bids – The Engineer shall assist the Owner in the review and evaluation of the bids. The Engineer shall prepare a letter of recommendation and attend the City Council meeting to support the recommendation, if required.
5. The scope of services for this work is based upon bidding and constructing the project as three construction projects (Bid Packages 1, 2, and 3) and on a maximum eight week bid period for each project. A maximum of two rounds of bids for each bid package are included in this scope. Packaging of the project into additional bid packages/contracts is not included in the scope of services; however, inclusion of these services may be addressed by amending the agreement.

B. PROJECT SCHEDULE

1. The Owner and the Engineer agree that time is of the essence and that delays in the design or construction may significantly impact the feasibility and/or cost of the Project.
2. The Engineer shall commence, carry on, and complete the Project with all dispatch in a sound, economical, and efficient manner, in accordance with the provisions hereof and all applicable laws. In accomplishing the Project, the Engineer shall take reasonable professional efforts to ensure that the work involved is properly coordinated with any related work being carried on by the City of Durham or its agents.

3. The following Project Schedule Table summarizes the anticipated Project Schedule.

PHASE	Due Date from NTP
90% Design Submittal (Bid Package 1)	2 months
Bid Ready Submittal (Bid Package1)	4 months
60% Design Submittal (Bid Package 2)	1 month from CLOMR approval
90% Design Submittal (Bid Package 2)	1 month from 60% comments
Bid Ready Submittal (Bid Package 2)	1 month from 90% comments
UV Preliminary Design TM (Bid Package 3)	6 weeks
30% Design Submittal (Bid Package 3)	3 months
30% UV Design Submittal	6 months
60% Design Submittal (Bid Package 3)	8 months
90% Design Submittal* (Bid Package 3)	12 months
Bid-Ready Submittal (Bid Package 3)	2 weeks following resolution of all permitting/submittal comments
Bid Phase (Bid Package 3)	3 months from advertisement date
30% Design Submittal (Bid Package 4)	7 months

* Permitting submittals to be on or before 90% submittal. Durham Site Plan submittals to be at 60% submittal.

C. PROJECT DELIVERABLES

The Engineer agrees to deliver to the Owner in a timely and proper manner the items set forth below, which shall become the property of Owner and may be used by the Owner without restriction or limitation and at no additional cost to the Owner:

- a. Hazardous Materials Testing Report
- b. Contract documents including drawings and specifications at the 30%, 60%, 90% and Bid Ready Submittals. Ten half size copies, two full size copies (Bid Ready only), and electronic copies in PDF shall be provided. Specifications shall be provided in searchable PDF format. Cost estimates will be provided at 60%, 90%, and Bid Ready milestones.
- c. The 30% Project Review deliverables shall include:
 - 1) Division 11 (Mechanical Equipment) Specifications
 - 2) Division 11 Equipment cut sheet binder

- 3) Mechanical plan layout drawings or 3D-CAD model for each unit process (i.e., headworks, clarifiers, sidestream treatment)
- d. Conformed contract documents incorporating all changes by addenda at the end of the Bid Period. Ten half size sets, two full size sets, and electronic copies in PDF shall be provided.
- e. Monthly project progress reports from the Engineer shall be submitted as an invoice cover sheet.

Exhibit A-3 – Construction Phase Services.

CONSTRUCTION PHASE SERVICES

AMENDMENT 2 - LIMITED CRS

1. Engineer will provide services as described in Exhibit A, Section A 1.05 Construction Phase for Bid Packages 1 and 2. Additional services are listed below.
2. Construction Administration - The following services will be provided during the construction administration phase of the project:
 - 1) Provide as-built record drawings, one set paper and one electronic (CAD/Revit and PDF) copy. These drawings shall be updated during project construction to ensure that all changes have been included and are reflected in the drawings.
 - 2) Provide updated Operations and Maintenance (O&M) Manuals for new equipment consistent with those produced under the 2011 Master Plan contract.
3. Construction Field Services - The following field services will be provided as necessary to assure high quality and conformity with project plans and specifications:
 - 1) Materials testing services will be provided as needed during the construction period to confirm berm material quality consistent with construction documents.
 - 2) An as-built topographical survey will be provided for Bid Package 2 to allow submittal of LOMR documentation.
 - 3) Resident Project Representative (RPR). Provide the services of an RPR at the Site to assist the Engineer and to provide more extensive observation of Contractor's work. Duties, responsibilities, and authority of the RPR are as set forth in Exhibit D. The furnishing of such RPR's services will not extend Engineer's responsibilities or authority beyond the specific limits set forth elsewhere in this Agreement. This scope is based upon a not-to exceed amount calculated using half-time (20 hours/week) construction inspection with an active construction time of 2 months for Bid Package 1, Control Panels. For Bid Package 2, Berm Improvements, this scope is based upon full time inspection for 3 months. Should the contractor schedule extend beyond these periods there will be a need to amend this agreement to extend the inspection period.